

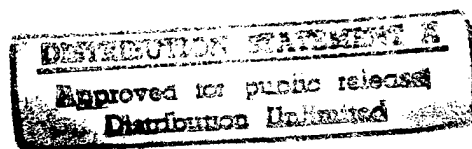
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USSR: Life Sciences



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UDC 557.2.08+57.085.23+577.171.6

Artificial Complexes for Selective Transfer of DNA Into Human Cells Via Receptor-Mediated Endocytosis

907C0784A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 312 No 2, May 90 (manuscript received 17 Aug 89) pp 493-494

[Article by A. A. Rozenkrants, S. V. Yachmenev, and A. S. Sobolev, Scientific Center for Developments and Application of Modern Methods of Molecular Diagnosis, Moscow]

[Abstract] A method was developed for the delivery of DNA into mammalian cells, based on the creation of soluble insulin-poly-L-lysine-DNA complexes. Poly-L-lysine was selected to serve as a bifunctional coupling agent, while the choice of insulin was predicated on the presence of cellular insulin receptors responsible for intracellular transport of insulin. A vector was constructed from plasmid pSVRP-8, which bears the large gene encoding T-antigen of virus SV-40, the expression of which served as a marker of transfection. The complexes were incubated with human hepatoma cell line PLC/PRF/5 in medium RPMI-1640 for 18 h at 37C in 5 percent CO₂. The efficiency of transfection was found to be approximately 0.95 percent. Consequently, the study demonstrated the successful introduction of foreign genetic material into mammalian cells using a soluble DNA complex relying on insulin receptors, a system that may find in vivo applications. Figures 1; references 11 (Western).

UDC 577.112.083+577.336

Extraction Ca²⁺-Activated Photoprotein Obelin From Obelia Longissima, and Its Use in Determining Ca²⁺ Release From Fractionated Sarcoplasmic Reticulum of Skeletal Muscles

907C0707A Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 62 No 2, Mar-Apr 90 (manuscript received 14 Feb 89) pp 69-76

[Article by G. I. Gitelson, V. A. Tugay, and A. N. Zakharchenko, Protein Institute, USSR Academy of Sciences, Moscow; Institute of Biochemistry imeni A. V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Obelin, a Ca²⁺-activated photoprotein from the hydroid *Obelia longissima*, was tested for its utility in the determination of Ca²⁺. Extraction of obelin involved lysis of the hydroids with a hypotonic solution, salting out with ammonium chloride, and column chromatography on DEAE-Sephadex A-25. Obelin was obtained in a 55 percent yield as a 1,000-fold purified protein determined to have a molecular weight of 24 kD. Preliminary assays demonstrated a linear relationship between luminescence and the concentration of free

Ca²⁺. Studies with vesicles derived from the sarcoplasmic reticulum of rabbit skeletal muscles showed a spontaneous biphasic release of Ca²⁺, consisting of an initial rapid phase followed by a slower phase of leakage. Confirmatory observations were obtained in studies employing ⁴⁵Ca²⁺. Addition of agents that disrupt membranes of the sarcoplasmic reticulum (ethanol and Triton X-100) and those that increase membrane permeability to Ca²⁺ (A23187 and adjustment of pH from 6.5 to 7.8) led to a sharp increase in Ca²⁺ loss as measured by the increase in photon emission by obelin. Analysis of the Ca²⁺ loss patterns from the vesicles suggested that the high rate of initial Ca²⁺ release, i.e., the first phase, was evidently due to movement of Ca²⁺ along specific calcium channels. The high sensitivity (10⁻⁸ M) of the obelin system makes it a particularly valuable biosensor for free Ca²⁺. Figures 4; references 16: 3 Russian, 13 Western.

UDC 577.151.03:577.152.311

Reactivation of Phosphorylated Cholinesterases Immobilized in Gelatin

907C0707B Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 62 No 2, Mar-Apr 90 (manuscript received 30 May 89) pp 93-96

[Article by L. I. Kugusheva and Ye. B. Nikolskaya, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] A comparative study was conducted on the inhibition and reactivation of free and gelatin-immobilized cholinesterases, with a special view toward reutilization of the latter in biotechnological processes. Evaluation of the enzyme kinetics demonstrated that inhibition was more pronounced with free acetylcholinesterase (EC 3.1.1.7) derived from human erythrocytes and butyrylcholinesterase (EC 3.1.1.8) from equine serum than with the immobilized preparations. In both cases complete reactivation was obtained with TMB-4 (1,1'-trimethylene-bis(-4-formyl-pyridine bromide)) following inhibition with paraoxon, O,O-dimethyl-O-(2,2-dichlorovinyl) phosphate, diisopropylfluorophosphate, or O-ethyl-O-(4-nitrophenyl)ethyl phosphonate (armin). The reaction rate of the irreversible inhibitors with the soluble enzymes was much greater than with the immobilized enzymes, with the difference attributed to diffusion factors in the immobilized preparations as well as to changes in the active centers. Measurements of the reactivation rates yielded essentially identical data for free and immobilized acetylcholinesterase and was in agreement with information in the literature. In the final analysis, these observations demonstrated that immobilized cholinesterases may undergo five to eight inhibition-reactivation cycles. Tables 2; references 8: 2 Russian, 6 Western.

UDC 615.384.547.963.4].012.1.07

**Structural and Functional Heterogeneity of
Artificial Oxygen Vehicle Based on Hemoglobin**

907C0781A Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY
in Russian Vol 109 No 3, Mar 90 (manuscript received
1 Feb 89) pp 254-256

[Article by Ye. P. Vyazova, M. A. Azhigirova, L. V. Fetisova, A. L. Shuvalova, and A. I. Zeynalov, Laboratory of Blood Protein Fractionation, Scientific Research Institute of Blood Transfusion, All-Union Hematological Scientific Center, Moscow]

[Abstract] Ion-exchange high pressure liquid chromatography was performed on preparations of glutaraldehyde-polymerized, pyridoxylated hemoglobin to assess the fraction spectrum and identify fraction(s) suitable for in vivo applications as oxygen vehicles. Fractionation was conducted on 7.5 x 150 mm Ultrapac TSK 545 DEAE columns in 0.05 M tris-HCl buffer, pH 8.0, employing a stepwise NaCl gradient from 0 to 1 M. The technique yielded eight fractions subjected further to antigenic analysis and efficiency as oxygen carriers. The results showed that fractions 3 and 4 with molecular weights in the 100 to 200 kD range did not differ antigenically from native hemoglobin, were free of unpolymerized hemoglobin, and exhibited adequate oxygen carrying capacity with P_{50} in the 21.1 to 23.9 mm Hg range. Accordingly, the use of these fractions in vivo would appear to have considerable advantages over the more heterogenous preparations. Figures 3; tables 1; references 11: 2 Russian, 9 Western.

UDC 615.373:578.245].07

Experimental Assessment of Recombinant Human γ -Interferon With Proteolytically Shortened C-Terminus

907C0769E Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII* in Russian No 3, Mar 90 (manuscript received 14 Feb 89) pp 89-93

[Article by A. A. Vorobyev, V. A.-V. Bumyalis, S. A. Tsarev, S. G. Arsenyan, V. A. Parfenov, D. V. Paulauskas, A. V. Klenova, L. A. Denisov, M. M. Mauritsas, V. D. Koltsov, L. I. Petrova, I. V. Dudich, Ye. I. Dudich, R. I. Masilyunayte, V. I. Marchenko, and A.-E. A. Yanulaytis, First Moscow Medical Institute imeni I. M. Sechenov, USSR Ministry of Health; Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of

Sciences, Moscow; "Ferment" Scientific Industrial Association (Vilnius) and Institute of Immunology (Moscow Oblast), USSR Ministry of Medical and Microbiological Industry]

[Abstract] Extensive physicochemical and biological studies were performed on recombinant human interferon- γ (rHu IFN- γ) produced by *Escherichia coli* MH-1-trp-2. Analytical studies demonstrated that rHu IFN- γ was a 15 kD molecule that shared the biological activities of the native IFN- γ molecule, an 18 kD entity, but was far less potent in a variety of biological testing systems. rHu IFN- γ was obtained with 99 percent purity, possessed a pI of 9.6, and sustained a loss of part of the C-terminus due to trypsin-like action in the course of *E. coli* disintegration. The latter interpretation is supported by the fact that lys-arg and arg-arg sites, on which trypsin acts, are located on the C-terminus of the IFN- γ molecule. The diminished biological activity of rHu IFN- γ was, accordingly, attributed to the absence or distortion of certain receptor binding sites. Figures 4; references 16: 2 Russian, 14 Western.

UDC615.275.4:577.117.2].07

Search for Novel Steroidal Immunomodulating Agents

907C0853A Moscow *FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian* Vol 53 No 3, May-Jun 90 (manuscript received 1 Feb 89) pp 20-22

[Article by B. B. Kuzmitskiy, M. B. Golubeva, N. A. Konoplya, N. V. Kovganko and A. A. Akhrem, Department of Biological Testing and Laboratory of Steroid Chemistry, Institute of Bioorganic Chemistry, Belorussian SSR Academy of Sciences, Minsk]

[Abstract] Search for novel steroidal immunomodulating agents led to an assessment of the effects of ecdysterone on humoral and cellular immunity in several lines of inbred mice. The results demonstrated that intragastric administration of 5-10 mg/kg of ecdysterone enhanced by 42-66 percent splenic antibody forming cells against SRBC, while having no pronounced effect on immediate hypersensitivity or graft-versus-host response. Increasing the dose to 20 mg/kg also enhanced the immune response in all three tests, indicating activation of T cells as well as B cells. Finally, a further increase in the dose of ecdysterone to 50 mg/kg exerted an inhibitory effect. These findings suggest that congeners of ecdysterone may be

synthesized with specific immunomodulating activities. Tables 2; references 11: 8 Russian, 3 Western.

UDC615.22.038.036.8

First Clinical Trial With Bonnecor

907C0853B Moscow *FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian* Vol 53 No 3, May-Jun 90 pp 65-67

[Article by M. I. Mironova, V. V. Lyskovtsev and N. V. Kaverina, Pharmacological Committee, USSR Ministry of Health; Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow]

[Abstract] Based on experience with bonnecor as an antiarrhythmic studied in the GDR, clinical trials with bonnecor were undertaken at 6 centers in Moscow and Leningrad. The resultant data demonstrated that bonnecor is a highly effective antiarrhythmic agent when administered intravenously in a dose of 0.4-0.6 mg/kg in patients with various forms of arrhythmia. The clinical benefits were dose-dependent and about 65 min in duration after a single intravenous administration. In addition, bonnecor was well tolerated, and lacked hypotensive and cardiac effects, observations pointing to its usefulness in cases of myocardial infarction and cardiac insufficiency.

Diphtheria Outbreaks Due to Vaccination Refusal

907C0711A Moscow IZVESTIYA in Russian
20 May 90 Morning Edition p 3

[Article by S. Tutorskaya: "An Epidemic Can Break Out"]

[Abstract] Last year several dissertations were defended on the possible side reactions of vaccines. This led to a campaign against diphtheria vaccination and many parents refused to have their children vaccinated. As a result, in Moscow alone 90 diphtheria cases were registered last year and 94 during the first four months of this year, four of which were fatal. The same pattern was observed in Leningrad and other cities and regions. The article attempts to explain the complications with any drug and relates similar experiences in Britain, Sweden, Japan etc. Obviously, children weakened by other medical conditions should not be vaccinated, but otherwise, the risk is minimal. An ideal solution would be to prepare genetically engineered drugs. In the meantime one must choose the lesser of two evils: vaccination creates immunity and saves lives.

UDC 616.992.282-036.22(470.23-25)

Human Cryptosporidiasis Identified in Leningrad

907C0720B Moscow MEDITSINSKAYA
PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI
in Russian No 2, Mar-Apr 90 (manuscript received
05 Oct 89) pp 45-48

[Article by T. V. Beyer, L. P. Antykova, G. I. Gerbina, V. G. Sargayeva, and N. V. Sidorenko, Institute of Cytology, USSR Academy of Sciences, Leningrad; Leningrad Pediatrics Institute, RSFSR Ministry of Health; Leningrad Municipal Sanitation-Epidemiology Station]

[Abstract] In 1987 epidemiological studies were initiated on human cryptosporidiasis while investigating AIDS-related infections. Three groups of individuals were examined. The first group consisted of workers employed in live-stock farming: 283 women and 74 men aged 20-61 years. Cryptosporidium oocysts were found in 5 women (1.4 percent) free of clinical symptoms. In the second group there were 127 patients with acute gastric infections and 44 AIDS patients who were being

treated in Leningrad Infectious Diseases Hospital No. 30; no cryptosporidia were found in this group. The third group included 373 children aged from 2 months to 10 years (168 boys, 205 girls) who were patients in Leningrad Infectious Diseases Hospital No. 13 imeni Pasteur. In this group 10 children with cryptosporidium oocytes were identified (2.7 percent). This group presented with clinical symptoms of enteritis and gastroenteritis that lasted up to 2 weeks (vomiting, diarrhea, weakness, and temperature of 39-40° C). The sources and routes of transmission of human cryptosporidiasis were not identified. References 38: 2 Russian, 36 Western.

UDC 616:98:578.833.29]-02-078.73(571.61)

Hemorrhagic Fever With Renal Syndrome Virus Caused by Rattus Serotype in Amur Oblast

907C0769C Moscow ZHURNAL MIKROBIOLOGII,
EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian
No 3, Mar 90 (manuscript received 5 Jan 89) pp 48-52

[Article by N. A. Marunin, I. N. Gavrilovskaya, Ye. A. Gorbachkova, N. S. Apekina, V. A. Fugurnov, K. F. Yakunin, N. G. Burlakova, and A. I. Lopatin, Blagoveshchensk Medical Institute; Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow]

[Abstract] Extensive serologic studies relying on indirect immunofluorescent techniques were employed in Amur Oblast to assess viral serotypes responsible for hemorrhagic fever with renal syndrome (HFRS). Studies on the sera of 28 patients revealed antibodies against Rattus, Apodemus and, in five cases, against Clethrionomys serotypes. Evaluation of the sera of 42 subjects with HFRS in the anamnesis (one-17 years ago) showed 100 percent to be positive against Rattus, 71 percent against Apodemus, and 7.1 percent against Clethrionomys serotypes. Finally, examination of 268 sera from healthy donors showed 4.2 percent to be positive against Rattus and 2.4 percent against Apodemus. The studies also gave evidence that an as yet unidentified HFRS serotype circulates in the region that cross-reacts very weakly with Rattus and Apodemus antisera. Accordingly, this study led to the first demonstration of the importance of the Rattus serotype in HFRS epidemiology in the Amur Oblast, as well as raised the index of suspicion of the presence of a novel, distantly related viral serotype. Tables 3; references 12: 7 Russian, 5 Western.

UDC616.155.2-036.12-085.272.4-036.8-07

Immunological Monitoring of Tactivin- and Levimasole-Treated Patients with Chronic Lymphocytic Leukemia*907C0852B Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 90 (manuscript received 26 Apr 89) pp 54-57*

[Article by T. P. Markova, Institute of Experimental Pathology and Therapy, USSR Academy of Medical Sciences, Sukhumi]

[Abstract] Patients with chronic lymphocytic leukemia (CLL) underwent immunological monitoring for seven years while managed with tactivin (14 cases) or levimasole (35), with parallel studies conducted on an analogous group of CLL patients in whom neither immunomodulator was employed. Over the seven years period the total levimasole dosage ranged from 2100 to 18,900 mg, while the total dosage of tactivin ranged from 1600-5600 mg. Chemotherapy was excluded from the therapeutic regimen while the patients were maintained on levisamole or activin. Both agents caused an increase in E-RFC, as well as the 'stable' and 'active' E-RFC components, a rise in T_p/T_y ratio (with relatively stable T_y counts in the levimasole group and a slight decrease in tactivin patients,) and a reduction in B cells bearing surface immunoglobulins. In addition, although counts of B cell with cytoplasmic IgM, IgG and IgA and κ and λ light chains were elevated, serum immunoglobulin levels remained unaffected. In the final analysis, levimasole was shown to prolong slightly the survival times, while tactivin stabilized the course of CLL and delayed the need for resumption of chemotherapy. Tables 3; references 15: 7 Russian, 8 Western.

UDC612.017.1.064].06:613.863].08

T-Suppressor and Opiatergic Mechanisms in Stress-Induced Immunodeficiency*907C0852C Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 90 (manuscript received 28 Apr 89) pp 68-70*

[Article by Ye. A. Kirilina, L. A. Zakharova, A. A. Mikhaylova and A. M. Vasilenko, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences]

[Abstract] An analysis was conducted on the involvement of T-suppressors and endogenous opiates in stress-induced immunosuppression. The basic experimental design relied on forced swimming (60 min/day, two days, 30°C water) of 18-20 g female (CBA x C57BL/6) F_1 mice, immunization with SRBC, and assessment of splenic and lymph node antibody forming cells. The results demonstrated that stress reduced the antibody response by 20-31 percent, a phenomenon that persisted for 72 h. Treatment of the splenic and lymphoid cells from

stressed animals with antibodies against T-suppressors precluded immunosuppression in the Jerne test. In addition, pretreatment of the animals with naloxone (5 μ g; i.p.), myelopid (100 μ g; i.v.), or simultaneously with their combination 20 min before swimming also reversed the adverse effects of stress on the immune response. The latter findings underscored the importance of opiopeptides in the function of T-suppressor cells. Figures 1; tables 3; references 17: 11 Russian, 6 Western.

UDC616-056.3-022.854-085-036.8-07:616.153.96-097

Enhancement of Blocking IgG Synthesis by Myelopid During Pollinosis Desensitization with Long-Acting Allergens*907C0852D Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 90 (manuscript received 5 Sep 89) pp 72-73*

[Article by Yu. A. Poroshina, O. V. Polsacheva, R. N. Stepanenko, Yu. S. Lebedin, S. M. Titova and I. V. Nefedova, Institute of Immunology, USSR Ministry of Health, Moscow]

[Abstract] Therapeutic trials were conducted with myelopid to assess its potential efficacy in desensitization of allergy. Ten men and women with pollinosis were desensitized with tsintanal PT-3 [sic], a preparation of allergens from three common grasses, over a three month period with a total dosage of 51,585 PNU. Myelopid (6 mg; s.c.) was administered 10 days after the last maximum dose of tsentanal PT-3. Immunochemical blood monitoring demonstrated that inclusion of myelopid markedly enhanced the synthesis of blocking IgG, from a pretreatment level of 0.34 Δ OD, to 0.58 Δ OD following desensitization, to 0.76 Δ OD with the desensitization + myelopid regimen. Nonspecific and specific IgE levels were not affected. Figures 1; tables 1; references 4 (Russian).

UDC 616-006.04-07:612.017.11/12

Immunogenicity and Protective Activity of Water-Soluble Polymer-Metal Protein Complexes*907C0784B Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 312 No 2, May 90 (manuscript received 11 Oct 89) pp 505-509*

[Article by R. V. Petrov, academician, M. I. Mustafayev, A. Sh. Norimov, and E. R. Eyvazova, Institute of Immunology, Moscow]

[Abstract] A series of experiments was conducted on the immunogenicity of water-soluble polymer-metal-protein complexes which demonstrated their utility in enhancing antibody response and, consequently, immunity. Studies with bovine serum albumin, and influenza virus hemagglutinin and neuraminidase antigens involved preparation of electrostatic complexes via Cu(II) and copolymers of either N-vinylpyrrolidone:acrylic acid

(equimolar; 50 kD) or N-vinylpyrrolidone: maleic anhydride (20 kD). Intraperitoneal immunization of CBA and (CBA x C57BL/6)F₁ mice showed marked enhancement of IgG and IgM production against the specific proteins in the electrostatic complexes. Using various techniques of detection as appropriate (enzyme-linked assay, passive hemolysis), IgM and IgG titers for the triple electrostatic complexes were in the 10,240-40,960 range versus control titers of 160. Additional studies with BCG and thymectomized, irradiated B mice reconstituted with bone marrow grafts showed that triple complexes incorporating BCG imparted considerable protection. The latter findings also demonstrated that such complexes behave as T-independent synthetic vaccines. Figures 2; tables 4; references 8: 7 Russian, 1 Western.

UDC 616.89-008.441.13-092:612.017.1+616.89-008.441.13-085.37-092.9

Immunological Paradoxes in Alcoholism: Perspectives for Immunotherapy

907C0708A Moscow IMMUNOLOGIYA in Russian
No 2, Mar-Apr 90 (manuscript received 13 Jul 89)
pp 4-8

[Article by V. A. Yevseyev, Institute of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow]

[Abstract] Alcohol intake has long been implicated as a causative factor in secondary immunodeficiency, allergic manifestations, and neuroimmunopathology. Nevertheless, the relationship between alcoholism and the immune system is characterized by a number of paradoxical situations. These include failure of in vitro attempts at reproduction of the inhibitory effects of alcohol on immunocompetent cells, an inverse relationship between predisposition to alcohol abuse and susceptibility of the immune system to alcohol, impairment of immune function as a result of abstinence, a sensitizing effect on the organism, enhancement of autoantibody formation against neuromediators in chronic alcoholism, and autoimmune mechanism-based modification of alcohol intake. Analysis of these factors led to experimental trials to determine whether immune modification of neuromediator levels would affect alcohol intake. Mice predisposed to intake of 15 percent ethanol solutions showed a three-fold drop in alcohol intake at the peak of anti-serotonin antibody response following immunization with serotonin-protein conjugates. Concomitantly, histochemical studies demonstrated a decrease in hypothalamic levels of serotonin and its metabolite, 5-hydroxyindoleacetic acid. Hypothalamic levels of serotonin in animals showing a preference for alcohol were elevated in comparison with control animals. These findings suggest that immunomodulation of neuromediator levels may have therapeutic significance

in alcoholism. Finally, it appears that anti-catecholamine antibodies may serve as diagnostic indicators of advanced alcoholism. References 68: 50 Russian, 18 Western.

UDC 615.373.03:616-092:612.017.1.064]-022.7:578.828.6]-078.333

Detection of Antibodies Against Human Immunodeficiency Virus-1 and Human Immunodeficiency Virus-2 With Synthetic Antigenic Determinants

907C0708B Moscow IMMUNOLOGIYA in Russian
No 2, Mar-Apr 90 (manuscript received 11 May 89)
pp 12-15

[Article by R. V. Petrov, R. M. Khaitov, V. T. Ivanov, I. G. Sidorovich, S. P. Pavlikov, I. A. Nikolayeva, M. Ye. Ivashchenko, V. S. Ivanov, A. T. Kozhich, and L. D. Chikin, Institute of Immunology, USSR Ministry of Health; Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Synthetic peptides were synthesized incorporating epitopes characteristic of human immunodeficiency virus (HIV)-1 and HIV-2 for use in screening studies relying on solid-phase enzyme-linked assays. Protein SP-8 bore the gp32 epitope of HIV-2, and SP14 the gp41 epitope of HIV-1. Studies with 6 HIV-2 positive sera were positive with SP8 and negative with SP14. Studies with 50 HIV-1 positive sera yielded positive results with the SP14 protein; however, three samples also reacted with SP8. In view of the lack of cross-reaction between SP8 and SP14, the data suggested the possibility of mixed infection with HIV-1 and HIV-2 or coinfection of the HIV-1 patients with an yet unidentified HIV variant. Figures 2; tables 2; references 6: 2 Russian, 4 Western.

UDC 616-092:612.017.1.064]-022.7:578.828.6]-078.333

Use of Synthetic Peptides in Diagnosis of Human Immunodeficiency Virus (HIV) Infections

907C0708C Moscow IMMUNOLOGIYA in Russian
No 2, Mar-Apr 90 (manuscript received 26 Jun 89)
pp 15-20

[Article by R. M. Khaitov, I. G. Sidorovich, S. P. Pavlikov, I. A. Nikolayeva, M. Ye. Ivashchenko, S. M. Andreyev, and L. Yu. Sklyarov, Institute of Immunology, USSR Ministry of Health, Moscow]

[Abstract] Synthetic peptides representing epitopes encoded by 'gag' and 'env' genes of human immunodeficiency virus (HIV)-1 and HIV-2 were tested in solid-phase enzyme-linked assays against sera derived from HIV-1 and HIV-2 patients. In the case of HIV-1 only a small number of peptides demonstrated requisite specificity, with strong epitopes localized to the C-terminus of

gp120 and the N-terminus of gp41. In addition, three anti-HIV-1 sera also reacted with a peptide bearing the gp32 epitope of HIV-2. The latter may have been due to either cross-reaction, double infection with HIV-1 and HIV-2, or coinfection of the HIV-1 patients with a novel HIV type. The synthetic peptides were immunogenic in mice and rabbits, and were effective in testing sera for the presence of anti-HIV-1 and anti-HIV-2 antibodies. The latter studies encompassed 5,812 sera, with the tests showing a sensitivity of 99.7 percent and a specificity of 99.81 percent. Figures 3; tables 6; references 18: 6 Russian, 12 Western.

UDC 612.017.1.014.46:661.185+615.28.017:615.275.4

Immunoadjuvant Properties of Surfactants

907C0708D Moscow *IMMUNOLOGIYA in Russian*
No 2, Mar-Apr 90 (manuscript received 1 Feb 89)
pp 38-40

[Article by Yu. S. Krivoshein and V. A. Shatrov,
Crimean Medical Institute, Simferopol]

[Abstract] Inbred and outbred mice differing in their antibody response to intraperitoneal sheep erythrocytes were pretreated intraperitoneally with surfactants to determine whether the latter possess adjuvant function. The results, assessed in terms of splenic antibody-forming cells, showed that cationic (benzene ring), nonionic (N-oxide of tertiary amine), and amphoteric (betaine) surfactants increased the antibody response to the T-dependent antigen. The efficacy of the surfactants was dose-dependent with a maximum antibody response obtained with 100 µg of surfactant per mouse, while a dose of 1,000 µg inhibited antibody formation. In terms of efficacy the surfactants ranked as follows: cationic > amphoteric > nonionic. In addition, surfactants with a C₁₃H₂₇ hydrophobic chain yielded the best results, and the effects were several-fold higher in mice regarded as natural poor responders than in natural high responders. Tables 2; references 14: 11 Russian, 3 Western.

UDC 616.36-002.1-022:578.891]-085.339:578.245]-
036.8-07

Treatment of HBsAg Positive Acute Viral Hepatitis With Recombinant Interferon (rINF)

907C0773A Moscow *KLINICHESKAYA MEDITSINA in Russian*
Vol 68 No 3, Mar 90 (manuscript received
1 Mar 89) pp 65-68

[Article by I. P. Gorbarets, Ye. S. Ketiladze, N. A. Farber,
N. P. Bugayeva, D. M. Braginskiy, N. A. Sergeyeva, I. N. Khlopova, and Ye. B. Nemtsova, Clinical Department,
Institute of Virology imeni D. I. Ivanovskiy, USSR
Academy of Medical Sciences, Moscow]

[Abstract] Therapeutic trials were conducted with Soviet rINF (INF-α₂) in the management of 411 acute cases of HBsAg-positive viral hepatitis. The patient cohort ranged in age from 16 to 75 years, consisting of 308 patients with

hepatitis B, 71 coinfections with delta virus, and 32 delta virus superinfections of HBsAg carriers. Experimental patients received one million IU of rINF intramuscularly twice a day within 1-5 days of onset of jaundice for 5-6 days, and then one million IU per day for an additional 5 days. The data showed that rINF was effective in the first two groups when administered prior to hepatic coma, but not in fulminating cases nor in patients with delta virus superinfection. Side effects were minimal, and consisted of a febrile response in 8 percent of the patients treated with rINF, an allergic reaction in one patient, and short-term leukopenia in 8.9 percent of the patients. Tables 1; references 8: 4 Russian, 4 Western.

UDC 616.248-085.339:578.245]-036.8-07

Effects of Leukinferon on Immunoreactivity of Patients With Steroid-Dependent Bronchial Asthma

907C0773B Moscow *TERAPEVTICHESKIY ARKHIV in Russian*
Vol 62 No 3, Mar 90 (manuscript received
21 Feb 89) pp 95-97

[Article by V. F. Marinin, A. A. Andryukin, V. P. Kuznetsov, Ye. G. Nastyukova, L. N. Dudkina, N. Yu. Nyaykina, and D. L. Belyayev, Chair of Internal Diseases No 1, Second Therapeutic Faculty, and Interclinical Immunological Laboratory, First Moscow Medical Institute imeni I. M. Sechenov; Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] Therapeutic trials were conducted with leukinferon, a novel Soviet therapeutic agent incorporating factors that activate phagocytosis, factors with direct antistaphylococcus and antitoxic effects, and factors that inhibit the migration of macrophages and neutrophils, in addition to tumor necrosis factor and IL-1, on 25 patients with steroid-dependent bronchial asthma. Leukinferon was administered via the respiratory route in a dose of 10,000 IU per day for six-eight days. Subjective and objective clinical data demonstrated that leukinferon was effective in alleviating typical symptomatology, and promoted a significant rise in circulating T-cells, phagocytically active cells, and levels of IgG and IgA. These observations showed that the injection form of leukinferon is effective as an inhalant in alleviating bronchial asthma and, in 14 patients, halved the maintenance dose of prednisolone to 5-10 mg/day. Tables 1; references 21: 19 Russian, 2 Western.

UDC 615.275.4.015.44.07

Mutagenicity Testing of Novel Immunomodulator

907C0769D Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian*
No 3, Mar 90 (manuscript received 14 Feb 89) pp 56-61

[Article by G. M. Volgareva, S. Ya. Savranskaya, Yu. D. Tolcheyev, and O. R. Anpilogova, Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov, USSR Academy of Medical Sciences, Moscow]

[Abstract] A comprehensive battery of tests was used to conduct mutagenicity testing of STP, an immunostimulant prepared from cultures of *Streptococcus* sp. TOM-1606 cultures. STP is a peptide that stimulates the humoral immune response and markedly enhances the phagocytic activity of macrophages, yet lacks toxicity in doses exceeding 10,000-fold doses required for immune effects. In vivo studies employing intraperitoneal administration to mice in doses ranging from $6.7 \cdot 10^2$ to $6.7 \cdot 10^4$ $\mu\text{g/kg}$ showed that STP did not increase the number of Howell-Jolly bodies (micronuclei) in bone marrow erythrocytes, i.e., that it was nonmutagenic in doses 1,000-fold greater than immunostimulant doses. In addition, the results were also negative in Ames' tests performed with *Salmonella typhimurium* TA-98 and TA-100. Figures 1; tables 2; references 12: 9 Russian, 3 Western.

UDC 616.89-008.441.33-07:[616.154.95:615.212.7].074

Laboratory Techniques for Diagnosing Drug Addiction: Novel Approaches. Immunologic Approach to Diagnosis of Drug Abuse

907C0623A Moscow VOPROSY NARKOLOGII
in Russian No 1, Jan-Mar 90 (manuscript received
28 Dec 88) pp 8-13

[Article by N. B. Gamaleya, All Union Scientific Center
of Narcology, USSR Ministry of Health, Moscow]

[Abstract] Various physical-chemical methods of detecting traces of opiates were reviewed, analyzing their shortcomings such as low sensitivity, qualitative rather than quantitative values, etc. The following immunological methods were reviewed stressing their simplicity: enzyme immunoassay (EIA), solid phase EIA or ELISA, radioimmunoassays, immunofluorescence analysis, etc. All of these methods are capable of proving that an individual has used drugs but not the extent of use or dependence on them. Drug dependence could be demonstrated by an assay based on complement absorption reaction. It was shown that the increased absorption of the complement by the serum of a suspected drug addict in the presence of morphine, ephedrine, or Barbamyl indicated the presence of antibodies to such preparations. However, this test appeared to characterize only the nonspecific changes in the immune status of the subject; positive tests were also seen in alcoholics who did not use any drugs. A solid phase EIA was developed for detection of antibodies to morphine in which the sensitivity was 0.5-1 ng/ml. Using this method, morphine antibodies were not observed in alcoholics nor in patients with various autoimmune disorders, in normal controls or even in ephedrine, hashish, or barbiturate users. These antibodies were found as a rule in repeat drug abusers; one-time or occasional users did not test positive. This test could show drug dependence even if drug traces could not be detected by other means in the body fluids. References 30: 11 Russian, 19 Western.

UDC577.391.611.42.621.375.8

Activation of Lymphocyte RNA Synthesis by He-Ne Laser Irradiation

907C0848I Moscow *RADIOBIOLOGIYA* in Russian
Vol 30 No 3, May-Jun 90 (manuscript received
10 Nov 88) pp 424-426

[Article by N. K. Smolyaninova, T. Y. Karu and A. V. Zelenin, Scientific Research Center for Technical Lasers, Troitsk, and Institute of Molecular Biology, Moscow, USSR Academy of Sciences]

[Abstract] ^{14}C -Uridine uptake was employed in monitoring RNA synthesis in lymphocytes following He-Ne laser irradiation (632.8 nm wavelength; $D = 56 \text{ J/m}^2$) or treatment with PHA (2 $\mu\text{g/ml}$.) The lymphocytes were

derived from healthy male donors and used as a suspension of 10^6 cells in medium 199 with 5 percent human serum at 37°C under 5 percent CO_2 . With both factors two peaks of enhanced RNA synthesis were observed at 1.5-2 and four-six h. In the case of the laser the increases were on the order of 140 and 120 percent, respectively, while with PHA the corresponding increments were on the order of 200 and 150 percent. However, following laser treatment RNA synthesis fell to baseline level in ca. seven h, whereas with PHA a third peak (ca. 200 percent) was obtained at 11-12 h. Since exposure of chromatin to He-Ne laser irradiation has been demonstrated to alter chromatin structure, the present findings show that such a change in chromatin structure is accompanied by increased transcription. Figures 1; references 5: 3 Russian, 2 Western.

UDC 616-006-085.277.3:615.453.4.015.2:615.2:615.847.8

**Magnetically Controlled Microcapsules in
Combined Chemothermomagnetic Therapy of
Experimental Tumors**

907C0781C Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY
in Russian Vol 109 No 3, Mar 90 (manuscript received
20 Sep 89) pp 295-296

[Article by V. A. Volkonskiy, L. Ye. Kholodov, Ye. K. Kazarina, and V. F. Gudov, Ferromagnetics Section, Scientific Research Institute of Medicinal Agents, USSR Ministry of the Biomedical Industry, Moscow Oblast]

[Abstract] Experimental therapeutic trials were undertaken on 180-200 g male Wistar rats bearing Walker's carcinosarcoma designed to compare various therapeutic modalities. The essential approach consisted of injection of Walker's carcinosarcoma into the tail, followed by

therapy. A 90 percent complete remission rate was obtained in 10 animals treated by one intravenous injection into the ventral tail vein of magnetic microcapsules, bearing 0.4 mg carminomycin (2 mg/kg), followed by thermotherapy in three and 72 h to raise tail temperature to 40°C for 30 min. The microcapsules were maintained at the site of the tumor by an external permanent magnet placed over the site. In this group there were no recurrences after 120 days in the nine surviving rats. All ten untreated control animals succumbed in 21 days after injection with the tumor cells, as did eventually all animals treated with soluble carminomycin (2 mg/kg/day for five days). Carminomycin microcapsules without thermotherapy gave a complete remission rate of 60 percent. The results with this model system were interpreted to indicate that magnetically directed delivery of the antineoplastic to the site of the tumor in conjunction with heat-sensitization of the malignancy represent an optimum therapeutic approach to the management of solid tumors. References 5 (Western).

UDC 615.919:579.843.1:579.253].07

Production of Exotoxin by Wild Strains of *Vibrio Cholerae*

907C0769A Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian*
No 3, Mar 90 (manuscript received 15 May 89) pp 6-10

[Article by N. I. Smirnova, L. F. Livanova, and G. A. Yeroshenko, "Mikrob" All-Union Scientific Research Antiplague Institute, Saratov]

[Abstract] Assay studies for exotoxin production were conducted on 27 strains of nonhemolytic *Vibrio cholerae* isolated from patients, encompassing classical and El Tor biovars. The study led to identification of four strains as producers: *Vibrio cholerae* (cholerae) Dacca 35, *Vibrio cholerae* (cholerae) Dacca 3, *Vibrio cholerae* (cholerae) B1307, and *Vibrio cholerae* (cholerae) J89. One Ogawa serovar, Dacca 35 (tox⁺Op⁻), was particularly productive (10-13 µg/ml) and differed in colonial morphology from nontoxigenic Dacca 35 strain (tox⁻Op⁺ (0.3 µg/ml)). Hybridization studies demonstrated that both (tox⁻Op⁺ and (tox⁺Op⁻ Dacca 35 variants possessed two copies of the vctAB gene on the chromosome, which is responsible for cholera toxin production. The fact that reversion from tox⁺ to tox⁻ was always accompanied by reversion from Op⁻ to Op⁺ suggests that an identical

element controls cholera toxin structural genes and genes encoding surface proteins. References 14: 4 Russian, 10 Western.

UDC 579.887.9:579.252.5].08

Legionella DNA Plasmid Transformation

907C0769B Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian*
• No 3, Mar 90 (manuscript received 5 Jan 89) pp 20-23

[Article by B. I. Marakusha, Ye. Yu. Feoktistova, I. S. Tartakovskiy, and S. V. Prozorovskiy, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] Genetic studies were conducted with *Legionella pneumophila* and *L. bozemanii* which showed that the various strains were transformed by plasmids pSC101, pBR322-RSF1010, pUC19, and pUC4K. With the CaCl₂ method efficiencies of 5.8·10⁻⁷ to 5.2·10⁻⁶ were obtained. Electrophoretic studies revealed that in some of the transformed cells, plasmids were detected with molecular weights similar to that of the transforming plasmid. In addition, pSC101 and RSF1010 were found to be relatively stable, with 75 percent of the clones losing the pBR322 component in the latter case. pUC19 and pUC4K were lost from 50-80 percent of the clones after three months. The present study represents the first successful transformation of *Legionella* by plasmids. Tables 1; references 17: 3 Russian, 14 Western.

UDC577.391.611.8

Effect of SFH Field on Dopamine-Dependent Behavior in Rats

907C0848G Moscow RADIOBIOLOGIYA in Russian
Vol 30 No 3, May-Jun 90 (manuscript received
17 May 89) pp 395-399

[Article by L. A. Andreyeva and V. F. Kononov,
Institute of Biological Physics, USSR Academy of Sciences, Pushchino]

[Abstract] Studies were conducted on the effects of an SHF field (0.88 GHz, 16 Hz frequency modulation, 8 mW/cm²) on apomorphine-induced circular movements in rats in order to elucidate the mechanisms of SHF action. Studies on 250-300 g outbred male rats demonstrated that exposure of the animals to SHF for 60 min followed by 1 mg/kg apomorphine i.p. reduced circular movements by 21 percent in comparison with the activity exhibited by rats treated only with apomorphine. Exposure of the animals to SHF for 60 min q.i.d. for five days reduced the level of circular running following apomorphine injection by 40 percent. Although there was considerable individual variability in the extent to which apomorphine-induced behavior was modified, the data indicate that the modality of SHF employed in this study influenced dopaminergic mechanisms since apomorphine binds to dopamine receptors. Figures 2; tables 1; references 23

UDC577.391;611.84/88

Effects of SHF Radiation on Evoked Potentials in Cat Spinal Cord

907C0848H Moscow RADIOBIOLOGIYA in Russian
Vol 30 No 3, May-Jun 90 (manuscript received
25 Aug 89) pp 400-404

[Article by V. Ye. Lebedev and O. O. Shugurov, Scientific Research Institute of Biology, Dnepropetrovsk State University]

[Abstract] Adult spinal and pentobarbital sodium-anesthetized cats were employed in a study designed to assess the effects of exposure to a 15 mW/cm² SHF field for 10 min on somatosensory (tibial nerve) evoked potentials in the spinal cord. The results demonstrated that within three h of exposure to SHF waves the amplitude of the H1 component fell by 80 percent from 1230 to 980 mV. Full recovery to baseline amplitude was observed after 30-40 h. The results with the spinal and anesthetized cats were essentially identical and demonstrated that electromagnetic intensities characteristic of those used in electrophysiological procedures alter the properties of neural elements. The most likely target of such physical challenge appear to be interneurons, relying as they do on electrical and chemical means of information transmission. Figures 1; tables 1; references 18: 15 Russian, 3 Western.

UDC 582.232.04:577.334

Effect Low Intensity Millimeter Wavelength Electromagnetic Radiation on Cyanobacteria Growth

907C0718B Moscow MIKROBIOLOGIYA in Russian
Vol 59 No 2, Mar-Apr 90 (manuscript received
03 Aug 88) pp 359-360

[Article by M. V. Gusev, A. Kh. Tambiyev, and N. N. Kirikova, Chair of Cellular Physiology and Immunology, Moscow State University imeni M. V. Lomonosov]

[Abstract] The physiological effects of low intensity millimeter wavelength electromagnetic radiation were investigated on unicellular *Anacystis nidulans* and filamentous species cyanobacteria *Anabaena variabilis*, *Fremyella diplosiphon*, *Plectonema boryanum*, *Spirulina platensis*, which varied in their degree of sensitivity to irradiation. The strongest stimulating effect was observed with 7.1 and 8.34 mm wavebands. Of all the bacteria investigated, the spirullines were shown to be stimulated the most by radiation. Their biomass was increased along with excretion of biologically active compounds and intensification of photosynthesis. Thus, it was shown that low intensity millimeter wavelength electromagnetic radiation could be used to stimulate the growth of cyanobacteria even on a commercial level. References 5: 4 Russian, 1 Western.

UDC 615.31:[547.95:547.943].017:615.211].07

Antinociceptive Properties of Dalargin in Anesthesiologic Practice907C0781B Moscow *BYULLETEN**EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 109 No 3, Mar 90 (manuscript received 25 Jul 89) pp 272-275*

[Article by B. M. Shloznikov, S. G. Donich, O. A. Grebenchikov, R. F. Makhmutov, V. V. Likhvantsev, A. Yu. Kuznetsov, A. I. Peretrukhin, and Ye. P. Fomchenkov, Department of Anesthesiology and Resuscitation, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Experimental trials were conducted on 250-300 g male Wistar rats to determine whether dalargin may be used to replace narcotic analgesics in anesthesiology. Hemodynamic monitoring of anesthetized animals (40 mg/kg pentobarbital sodium, intraperitoneally) showed that intravenous dalargin in myorelaxant-treated (0.1 mg/kg arduan) animals alleviated changes due to pain stimuli. Under the conditions of the study dalargin was most effective in a concentration of 17.2 mg/kg. Administration of naloxone (100 mg/kg) 6 min before or 15 sec after dalargin abolished the protective

effect of the latter. These findings indicate that dalargin may well represent a promising alternative to narcotic analgesics in the practice of anesthesiology. Tables 2; references 10: 9 Russian, 1 Western.

UDC 615.357.814.53.015.2:615.214.22:547.829].076.9

Effect of Single and Repetitive Administration of Melatonin on Relearning of Rats in Y-Maze and Their Sensitivity of Haloperidol907C0722A Moscow *FARMAKOLOGIYA I**TOKSIKOLOGIYA in Russian Vol 53 No 2, Mar-Apr 90 (manuscript received 07 Apr 89) pp 15-17*

[Article by K. B. Ovanesov, Chair of Pharmacology, Stavropol Medical Institute, Stavropol]

[Abstract] Administration of a single dose (10 mg/kg) of the principal epiphysis hormone, melatonin, or its repeated injection at a lower dose (1 mg/kg daily for 10 days) improved to the same extent the relearning parameters of rats in the Y-maze and shortened latency of the avoidance reaction. This could be a result of the sedative property of melatonin: by lowering the emotional state, melatonin also potentiated the action of haloperidol. Figure 1; references 11: 6 Russian, 5 Western.

UDC 616.072.7+612.82:621.311.22

Rating Electroencephalograms When Determining Fitness for Operator Training

907C0703 Kiev *FIZIOLOGICHESKIY ZHURNAL*
in Russian Vol 36 No 2, Mar-Apr 90 pp 71-77

[Article by A. V. Gerasimov, Kiev Scientific Research Institute of Industrial Hygiene and Occupational Diseases, UkSSR Ministry of Health]

[Text] The number of accidents caused by operator error in industrial enterprises and in transportation has increased considerably in the last 10 years. One of the main causes of incorrect actions performed by those who are responsible for accidents is a disparity between psychophysiological status and occupational requirements. Development of effective methods that use psychophysiological criteria to predict success in the mastering and performing operator activity acquires special significance in that regard. Electroencephalography (EEG), which is an integral indicator of brain bioelectric activity and a reflection of neurodynamic features of higher nervous activity, is one of the most informative and dependable predictive criteria used in occupational psychophysiological screening of operators.^{2,4} Despite some progress in using computers to process and analyze EEGs,^{1,10,11} the development of EEG criteria for occupational screening that are based on visual analysis of the EEG is still of theoretical and practical importance.^{2,6} In order to predict success of training and subsequent occupational activity of operators, we developed a procedure for rating EEGs; we also developed the corresponding electroencephalographic criteria. The results of the practical use of such a prediction are reflected in the work reported in this paper. Despite the fact that the procedure was created on the basis of comprehensive psychophysiological examinations of operators of nuclear electric power plants and heat-and-electric power plants, it can be used effectively in occupational screening of people for other types of operator activity.

Methodology

A total of 158 essentially healthy students 20-40 years of age were examined during their occupational training at the training center of the UkSSR Ministry of Power and Electrification. EEGs were recorded once (at the beginning of occupational training) in an electrically insulated, noise-proof chamber under moderate illumination with an 8-channel BCT-112 electroencephalograph (GDR). The active electrodes were applied symmetrically in accordance with the international "10-20" system.⁹ Monopolar EEG recordings from frontal F_1 and F_2 and occipital (O_1 and O_2) leads were analyzed. The indifferent electrode was positioned on the right mastoid process. During the examination, the subject was in a reclining position in a special chair. We began by recording the background EEG with the subject's eyes open. Then we conducted two or three functional eye-opening and -closing tests, and we imposed a psychomotor load with a Tsentr-2 radio-reflexometer that we had modified.⁸ In the process, we evaluated functional mobility and CNS performance indicators on the basis of a determination of the maximum rate of correct differentiation of stimuli, in a situation requiring a choice from among three signals.⁸ A complex of 124 encephalographic indicators was obtained and analyzed for each subject. The complex included the amplitude-frequency characteristic of the principal components of brain bioelectric activity and their relative contribution (in percent) to the total EEG; values for the bioelectric response to the opening and closing of the eyes; and the ratio of the latent periods of that response. The EEG indicators were determined separately for each lead in a state of rest and after the psychomotor loading. EEGs were recorded with the eyes open and in an undarkened experimental chamber before and after the psychomotor load not only because of the specific features of operator's job, but also because of the need for predicting the effectiveness of training and subsequent workplace activity. Similar requirements for electroencephalographic examination used in occupational screening of military operators or in the prediction of success of activity in unusual conditions are presented in other papers.^{2,10}

Table 1. Coding of Parameters Describing the EEG

Parameter Number	Parameter	Gradation	Code
1	Dominant EEG components	Alpha waves	1
		Beta waves	2
		Theta waves	3
		Delta waves	4
		Combination of various waves	5
2	Amplitude of dominant EEG components	Very low—10 μ V or under	1
		Low—11-20 μ V	2
		Moderately low—21-30 μ V	3
		Medium—31-55 μ V	4
		Moderately high—56-70 μ V	5

Table 1. Coding of Parameters Describing the EEG (Continued)

Parameter Number	Parameter	Gradation	Code
		High—71-100 μ V	6
		Very high—101-150 μ V	7
3	Alpha-wave characteristics	No waves	1
		Single waves, single wave groups	2
		Alpha-rhythm regular in frequency and modulated in amplitude with an alpha index of:	
		low—20% or under	3
		medium—21-60%	4
		high—61-80%	5
		very high—> 80%	6
		Noticeably disorganized alpha waves in terms of frequency and amplitude	7
		Extremely disorganized polymorphic polyfrequency alpha waves	8
4	Representation of beta waves	No waves	1
		Very low—20% or under	2
		Low—11-20%	3
		Moderately low—21-30%	4
		Medium—31-60%	5
		High—61-80%	6
		Very high—> 80%	7
5	Representation of theta waves	No waves	1
		Very low—20% or under	2
		Low—11-20%	3
		Moderately low—21-30%	4
		Medium—31-60%	5
		High—61-80%	6
		Very high—> 80%	7

Table 2. Determination of EEG Types and Subtypes on the Basis of Codes of EEG Description Parameters

Type EEG	Subtype	Number* of EEG Description Parameter				
		1	2	3	4	5
I (organized)	1	1	4,5	5,6	1-3	1-3
	2	1	3-5	3,4,7	2-4	1-3
II (synchronous, monorhythmic)	3	1	6	6	1,2	1,2
	4	2	1,2	1	7	1,2
	5	2	1,2	1	7	1,2
	6	2	1,2	2	6,7	1-3
	7	3	3	1,2	1-3	6-7
III (disorganized)	8	1	2-5	7,8	1-4	1-3
	9	2	1,2	2,3;7,8	6,7	1-3
	10	5	1-5	2-4;7,8	2-4	2-4
IV (low amplitude)	11	1	2	4-8	1-4	1-3

Table 2. Determination of EEG Types and Subtypes on the Basis of Codes of EEG Description Parameters (Continued)

		Number* of EEG Description Parameter				
	12	3	2	1-3;7,8	1-4	5-7
V (flat)	13	1	1	7,8	1-4	1-3
	14	3	1	1-3;7,8	1-4	5-7
VI (borderline)	15	1	7	5,6	1-3	1-3
	16	1-5	1-7	1-7	1-7	1-7
	17	1-5	1-7	1-7	1-7	1-7
	18	1-5	1-4	2,3	1-7	1-7
	19	1	3-6	3-6	1-6	1-6

*The number of the parameter describing the EEG corresponds to its number in Table 1.

The most informative components in relation to successful mastery of the occupation of power-generating-unit operator were isolated from the initial body of data on the basis of the results of correlation-regression analysis. Those EEG description parameters and the system for ranking them are shown in Table 1. Use of that table assumes not complete description of the EEG, but the isolation of the most essential traits characterizing the features of the spatial and temporal organization of the EEG and its representation in the form of a numerical code. The code obtained for an individual EEG is identified with one of the EEG types via Table 2, the columns of which present EEG code variations that corresponding EEG subtypes and types in relation to each EEG description parameter. EEGs exhibiting pathological activity were not included in the sample, since people with such EEGs require in-depth clinical examination with subsequent resolution of the question as to their suitability in terms of health for operator activity. Individual variations in brain bioelectric activity within a given type that reflect features of CNS functional state determine the need for isolating relatively homogeneous subtypes, which makes it possible to describe the EEG more precisely.

The results were subjected to mathematical treatment with an SM-4 computer by the methods of variance analysis and step-by-step multivariate correlation-regression analysis.

Results and Discussion

The first type of EEG is noted for 17 percent of the subjects. It is typified by curves with a dominant alpha-rhythm that is organized in time and space. Subtype 1 pertains to EEGs of 8 percent of operators with an alpha rhythm that is amplitude-modulated, but regular in terms of frequency; the amplitude of the alpha rhythm is usually medium or moderately high. The alpha index is from 50 to 80 percent. Subtype 2 is typified by EEGs with dominant monomorphic and monofrequency alpha activity. The alpha rhythm assumes the nature of bursts, the amplitude is average and moderately low, and the alpha index is less than 50 percent. Alpha activity is labile, it is variable in amplitude, and it is interspersed with bursts of beta activity. The appearance of solitary

theta and delta waves with amplitudes not exceeding 30 μV on the EEG is possible. Subtype 2 pertains to 9 percent of the subjects. The second type is characterized by synchrony and monorhythmicity of bioelectric activity, and it was recorded in 31 percent of the subjects. Subtype 3 includes EEGs dominated by alpha rhythms with amplitudes from 70 to 100 μV and an alpha index greater than 80 percent. Such EEGs are noted among 5 percent of the subjects. Subtype 4 consists of EEGs with a beta-rhythm frequency greater than 14 sec^{-1} , but less than 20 sec^{-1} . There are no waves in the alpha and delta ranges. Solitary theta waves with amplitude of up to 30 μV may be recorded. This subtype was recorded from 7 percent of the operators. Subtype 5 includes 5 percent of the EEGs, and it is distinguished from subtype 4 by the frequency of the beta rhythm—greater than 20 sec^{-1} . The amplitude of the beta rhythm in subtypes 4 and 5 is less than 20 μV . Subtype 6 was recorded from 11 percent of the operators, and it includes EEGs with a dominant beta rhythm and solitary alpha and theta waves, or with short solitary bursts of alpha and theta activity. Subtype 7 includes 4 percent of the EEGs, in which waves of the theta range with amplitude up to 30 μV dominate. Waves of other frequency ranges are solitary, or they appear in the form of short and rare bursts (of three to five waves each).

The third type of EEG is the most widespread, and it is encountered in 38 percent of heat-and-electric and nuclear electric power plant operators. It is distinguished by disorganization, polymorphism and polyfrequency of bioelectric activity. Subtype 8 includes EEGs dominated by polyfrequency and polymorphic alpha activity. Pronounced variability of the amplitude of alpha waves and presence of a moderate number of waves in other EEG frequency ranges are noted. This subtype was recorded from 24 percent of the subjects. Subtype 9 includes 4 percent of EEGs dominated by waves of the beta range, the amplitude of which does not exceed 20 μV . Moderate polymorphic, polyfrequency activity of waves in other EEG ranges is noted. Subtype 10 is made up of EEGs typified by moderate representativeness of different frequency ranges. This subtype was recorded among 10 percent of the subjects. In all subtypes of the third type of EEG, peaks and sharp waves with amplitude not greater than 20 μV may be noted.

The fourth type is rarely encountered among heat-and-electric and nuclear power plant operators. It includes 2 percent of the EEGs, having wave amplitudes from 10 to 20 μV . Subtype 11 contains EEGs dominated by alpha activity, while theta activity dominates in subtype 12. Each of these subtypes was recorded from approximately 1 percent of the subjects.

The fifth type includes "flat" EEGs (with amplitude not greater than 10 μV). Subtypes 13 and 14 were noted among 4 percent of the operators, and they are similar in dominant activity to subtypes 11 and 12 respectively.

The sixth type of EEG contains so-called borderline or conditionally normal EEGs,⁷ recorded among 9 percent of the subjects. Subtype 15 is the basis of this type. It consists of EEGs dominated by an alpha rhythm with an amplitude from 100 to 150 μV that disappears in response to afferent stimulation (the "activation response"). The alpha index usually exceeds 60 percent. This subtype contains over 5 percent of all EEGs (over 60 percent of the EEGs of type IV). Subtype 16 consists of EEGs having waves of the beta range with amplitude greater than 20 but not less than 40 μV in their composition, regardless of the form of the dominant bioelectric activity. Subtype 17 includes EEGs containing theta and delta waves with amplitude greater than 30 but less than 50 μV and not exceeding 25 percent of the total recording time, as well as waves not appearing as bilaterally synchronous bursts or regular local changes. Subtype 18 includes EEGs on which bursts of alpha-waves of moderate amplitude are recorded on the background of "flat" or low-amplitude activity. These subtypes (16-18) are encountered relatively rarely. Each of them was recorded in not less than 1 percent of the cases. Subtype 19 includes all EEGs possessing a normal alpha rhythm and alpha waves with sharp summits. This subtype is noted among 2 percent of the operators.

It should be noted that despite certain outward similarity, the EEG rating system is fundamentally different from the EEG classifications offered by Zhirmunskaya⁵ and Malkin.² Development of strictly quantitative parameters by which to describe the EEG and minimization of their gradations made it possible to simplify considerably the classification of the EEGs and accelerate coding of electroencephalographic indicators. By introducing multidimensional regression models and criteria for identifying the basic variants of borderline EEGs into the EEG rating system, we obtain a possibility for not only classifying the individual EEG as being of a certain type but also obtaining a quantitative prediction of the effectiveness of the training and work of an applicant for an operator position without having to have significant personal experience in reading EEGs. Reactive shifts in brain bioelectric activity are also considered in this case, which raises the reliability of the conclusion considerably.

Multidimensional regression models accounting for EEG parameters before and after a psychomotor load were developed in order to permit prediction of the

success in mastering and carrying out operator activity on the basis of the EEG rating system. The average number of points (in a five-point system) reflecting the success of mastering the theoretical course and occupational skills with a full-scale integrated trainer was adopted as the integral training effectiveness indicator (ITEI), calculated on the basis of the EEG. The average error of predicting the ITEI is ± 10 percent:

$$\text{ITEI} = 3.6 + 0.12A - 0.04B + 0.039C - 0.036D - 0.277E + 0.167F - 0.045G,$$

where A is the EEG subtype with occipital leads and eyes open, prior to the load; B is the EEG subtype with frontal leads and eyes closed, after the load; C is the EEG subtype with frontal leads and eyes open, after the load; D is the EEG subtype with frontal leads and eyes closed, prior to the load; E is the EEG type with occipital leads and eyes open, prior to the load; F is the EEG type with occipital leads and eyes closed, prior to the load; G is the EEG subtype with occipital leads and eyes closed, prior to the load; H is the EEG subtype with frontal leads and eyes open.

When it is impossible to apply a psychomotor load, a regression model including electroencephalographic criteria of the background EEG should be used:

$$\text{ITEI} = 3.6 + 0.0367H - 0.0477D + 0.1A - 0.247E.$$

It should be emphasized that when this regression model is used, the accuracy of the prediction and the coefficient of multiple correlation of the actual examination-based and predicted assessments of the effectiveness of occupational training decrease by an average of 25 percent. This is apparently associated with the fact that one of the principal occupational requirements is the ability of the operator to adequately transform a functional state equal to changes in the operational situation.

Use of the EEG rating system significantly reduces labor outlays while increasing the speed and precision of visual reading of EEGs. In addition, preparation of large volumes of these data and inputting them into a computer for subsequent mathematical treatment are facilitated. When the EEG rating system is used in integrated psychophysiological examination of operators, the coefficient of multiple correlation between the ITEI and a complex of psychophysiological criteria⁴ increases from 0.66 to 0.82—that is, by 25 percent—while prediction accuracy increases by a factor of 1.5.

It should also be noted that the isolated types of bioelectric activity distribute themselves extremely nonuniformly among the occupational fitness groups of operator personnel. In particular, borderline EEGs were noted among 10 percent of subjects in the first occupational fitness group (absolutely fit), which contains 15 percent of all subjects. The second occupational fitness group (occupationally fit) contains 58 percent of the operators. Twenty-seven percent of people in this group have borderline EEGs. In the third occupational fitness group (conditionally fit), borderline EEGs were recorded

from 36 percent of the subjects. Twenty percent of all subjects in this group are operators. Among students of the training center who were recognized to be occupationally unfit (the fourth occupational fitness group) and who did not receive a certificate entitling them to oversee a power-generation unit, borderline EEGs were revealed among 41 percent of the subjects. They represent 6.7 percent of all subjects. Borderline EEGs are apparently a prognostically unfavorable characteristic, an electrophysiological correlate of low success in mastering and carrying out operator activity, for people in operator occupations.

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Morbidity Due to Cancer of the Large Intestine in Moscow*907C0829A Leningrad VOPROSY ONKOLOGII
in Russian Vol 36 No 5, May 90 pp 523-528*

[Article by V. V. Filipchenko, T. Kh. Basiyeva and D. G. Zaridze, All-Union Oncology Scientific Center of the USSR Academy of Medical Sciences, Moscow]

[Text] The great interest in the study of cancer of the large intestine stems from the fact that, in economically developed countries, the large intestine is among the trinity of the locations of the most widespread malignant tumor sites. Together, cancer of the large intestine, breast cancer, and lung cancer are blamed for more than 50 percent of all deaths due to malignant tumors in Western countries.⁵ In the United States, cancer of the large intestine represents 15 percent of oncological morbidity and 13 percent of oncological mortality.¹¹ In the USSR, rectal cancer represents 4.3 percent of all forms of cancer,¹ colon cancer morbidity was not studied by official statistics until recent years, and only the results of isolated studies have been published.²⁻⁴ The hypothesis that cancer of the large intestine is connected to lifestyle factors encountered in economically developed countries (high-fat, low-fiber diet, sedentary lifestyle, few births among certain women) is being widely studied today in the world.

Materials and Methods

The research used data obtained from the processing of information on all initially recorded cases of colon or rectal cancer in Moscow in 1985-1987; the information was provided to us by the Moscow City Oncological Dispensary, were used in the research. Information on first-time diagnoses of colon or rectal cancer (form No. 0.90./4) was fed into a computer data base, with subsequent alphabetization and mathematical treatment. The following morbidity indicators for colon and rectal cancer were computed: age figures and rates per 100,000

population, standardized in relation to the world population; indicators standardized in relation to the world population were calculated for various sites by section of the colon for ages under and over 50.

Morbidity data for 1971-1980 were taken from the statistical collection "Malignant Tumors in Moscow in 1971-1980," edited by A. A. Legkov et al.²

Morbidity dynamics were calculated by exponential regression with the formula " $\log y \approx a + bx$," on the basis of logarithmic expression of observed levels of morbidity from 1971 through 1980 and from 1985 through 1987. The quality of the baseline data's approximation was evaluated with a regression equation that used a determination coefficient R^2 , and the level of significance p and the average annual percentage increment were calculated in relation to each trend on the basis of the regression coefficient " b ".¹⁰ All data processing was done with standard software packages for personal computers (DBase III Plus, Frame Work II, Statgraphics, SPSSPC).

Results

Over the period from 1985 through 1987, a total of 5,664 cases of colon cancer and 3,863 cases of rectal cancer were recorded and treated. The actual recorded colon and rectal cancer morbidity (intensity indicators) was higher among women, which was a reflection of the quantitative composition of the male and female population in Moscow. After the indicators were standardized on the basis of the world population figures, colon cancer morbidity was found to be somewhat higher among men than among women (the ratio of the indicators was 1.24), and the rectal cancer morbidity was considerably higher among men than among women: the ratio of indicators was 1.44 (Table 1). Rectal and colon cancer morbidity indicators increase with age; this growth is especially intensive after an age of 50 years (figures 1 and 2). It was noted that, under 50 years of age, colorectal cancer morbidity indicators were higher among women; whereas, over 50, a more intensive growth of indicators begins in men.

Table 1. Colorectal Cancer Morbidity in Moscow in 1985-1987

Site	Year	Sex	Morbidity per 100,000 Population (Intensity Indicator)	Morbidity per 100,000 Population (Standardized Indi- cator, Standard Error)	M/F
Colon	1985	M	19.14	15.84 (0.63)	1.19
		F	24.49	13.36 (0.42)	
	1986	M	19.04	16.33 (0.63)	1.26
		F	24.41	12.95 (0.41)	
	1987	M	18.31	15.91 (0.63)	1.27
		F	24.08	12.52 (0.40)	
	1985-1987	M	18.49	16.01 (0.63)	1.24
		F	24.52	12.94 (0.41)	

Table 1. Colorectal Cancer Morbidity in Moscow in 1985-1987 (Continued)

Site	Year	Sex	Morbidity per 100,000 Population (Intensity Indicator)	Morbidity per 100,000 Population (Standardized Indicator, Standard Error)	M/F
Rectum	1985	M	13.76	11.76 (0.53)	1.33
		F	16.10	8.83 (0.34)	
	1986	M	14.28	12.35 (0.55)	1.50
		F	15.02	8.21 (0.33)	
	1987	M	14.15	12.16 (0.54)	1.48
		F	15.50	8.33 (0.33)	
	1985-1987	M	14.06	12.11 (0.54)	1.44
		F	15.54	8.42 (0.33)	

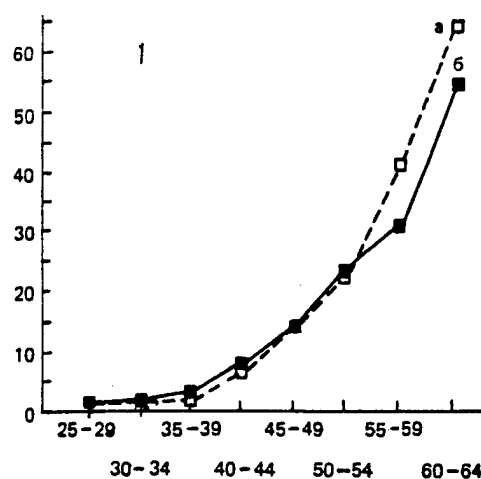


Figure 1. Colon Cancer Morbidity: a—men; b—women. x-axis—age groups; y-axis—colon cancer morbidity indicators per 100,000 population in 1985-1987

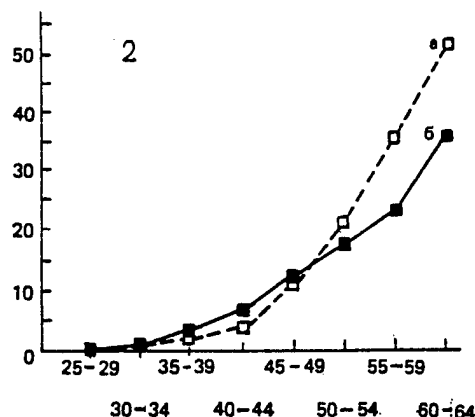


Figure 2. Rectal Cancer Morbidity: a—men; b—women. x-axis—age groups; y-axis—rectal cancer morbidity indicators per 100,000 population in 1985-1987

A tendency for growth of colon cancer morbidity was found in both men and women, but morbidity grew faster among men. The rectal cancer morbidity indicators for the same period of time increased consistently among men only; the tendency for growth of morbidity was statistically insignificant among women. For analysis of age-related trends, indicators were calculated in relation to 10-year age intervals (Table 2). Growth of colon cancer morbidity was discovered among men in age groups over 50, with morbidity increasing faster in the 50-59 group. Among women, a tendency for growth of colon cancer morbidity was found in age groups from 40 to 69, and the greatest increment was noted in the 40-49 group.

A reliable decline in rectal cancer morbidity was found among men 30-39 years old; growth of morbidity was noted in the 50-69 groups; and the rate of increase was higher in the 50-59 group. Among women, a slight growth of rectal cancer morbidity could be discerned in the 40-49 group only.

Analyzing the standardized morbidity indicators for different sections of the colon in men and women under and over 50 years of age, we identified the following distinctive feature: morbidity indicators after the age of 50 repeat the pattern revealed in the study of all age groups—i.e., the frequency of cancer of the cecum and of the ascending, transverse and descending colon is the same in men and women, while the sigmoid colon and rectum are afflicted more often in men (figures 3, 4). In the under 50 group, the opposite pattern is observed: in men, the ascending colon is subject to malignant affliction more often; whereas in women, the same is true for the sigmoid colon.

Discussion

Colon cancer morbidity varies in different regions of the world, with the highest indicators encountered in the United States, Canada and the Western European countries, and the lowest in Asia and Africa. Rectal cancer morbidity is also considerably higher in North American and Western European countries than in Northern and

Table 2. Colorectal Cancer Morbidity Dynamics by Age Group

(1) Локализация и пол	(2) Возраст больного, годы	Заболелаемость на 100 000 насе- (3)ления**		(4) Коэффициент детермина- ции (%)	(5) Среднегодовой процент прироста (ДИ 95 %)	(6) Значимость тренда, р	
		1971	1987				
(7) Ободочная кишка	М	(8) Все воз- расты	9,6	15,91	91,05	7,14 (5,78 8,52)	<0,0001
		29	0,2	0,17	27,40	-9,10 (-17,15 -0,27)	H3*
		30-39	1,7	1,89	5,36	-2,90 (-9,74 4,46)	H3
		40-49	8,5	8,26	25,30	3,22 (-0,05 6,59)	H3
		50-59	18,6	35,65	76,45	9,40 (6,21 12,64)	<0,0001
		60-69	47,4	71,81	86,92	7,10 (5,42 8,79)	<0,0001
		70	87,0	57,10	73,35	6,90 (4,39 9,47)	<0,001
	F	Все воз- расты	7,6	12,52	50,64	4,68 (1,92 7,50)	<0,01
		29	0,1	0,17	0,17	-0,99 (-14,23 14,28)	H3
		30-39	1,8	2,77	1,54	-1,34 (-7,41 5,14)	H3
		40-49	6,2	9,46	65,77	8,20 (4,63 11,90)	<0,001
		50-59	16,5	27,38	60,06	5,62 (2,88 8,45)	<0,01
		60-69	42,2	63,17	56,21	5,48 (2,59 8,45)	<0,01
		70	154,7	107,68	22,28	3,75 (-0,38 8,04)	H3
(9) Прямая кишка	М	Все воз- расты	9,7	12,16	60,46	3,59 (1,86 5,35)	<0,01
		29	0,4	0,06	29,27	-16,50 (-29,28 -1,46)	H3
		30-39	2,0	1,31	56,02	-11,07 (-16,37 -5,43)	<0,01
		40-49	5,7	7,53	15,61	3,73 (-1,35 9,07)	H3
		50-59	22,0	27,96	75,50	6,88 (4,50 9,29)	<0,001
		60-69	42,3	60,67	40,34	2,77 (0,77 4,80)	<0,05
		70	93,0	109,85	25,51	3,15 (-0,03 6,44)	H3
	F	Все воз- расты	6,9	8,22	0,69	0,34 (-2,10 2,85)	H3
		29	0,5	0,06	23,02	-13,67 (-26,36 0,19)	H3
		30-39	2,2	0,79	21,57	-9,07 (-18,31 1,21)	H3
		40-49	7,7	7,99	30,90	4,33 (0,49 8,31)	<0,05
		50-59	15,4	20,99	13,77	1,86 (-0,88 4,68)	H3
		60-69	29,3	39,87	0,46	0,42 (-1,42 2,30)	H3
		70	51,8	65,69	0,07	0,13 (-2,89 3,26)	H3

* Результат статистически не значим (10)

** Стандартизованные показатели. (11)

Key: 1. Site and sex—2. Patient age, in years—3. Morbidity per 100,000 population—4. Determination coefficient (in percent)—5. Average annual percentage increment (95 percent confidence interval)—6. Trend's significance, p—7. Colon—8. All ages—9. Rectum—10. Results statistically insignificant—11. Standardized indicators

Eastern Europe or in Asian and African countries. In regions of low morbidity, the incidence of colon and rectal cancer is roughly the same; where morbidity is high, colon cancer is encountered much more frequently.⁸

Growth of colorectal cancer morbidity is pronounced in regions with initially low indicators, while in some

countries with traditionally high morbidity levels, stabilization of indicators or even a certain decline were noted in the last decade.⁹

Papers on colon cancer morbidity in the USSR have not been published regularly, a fact that makes it difficult to obtain a picture for the country as a whole. However, the available material indicates that the highest morbidity

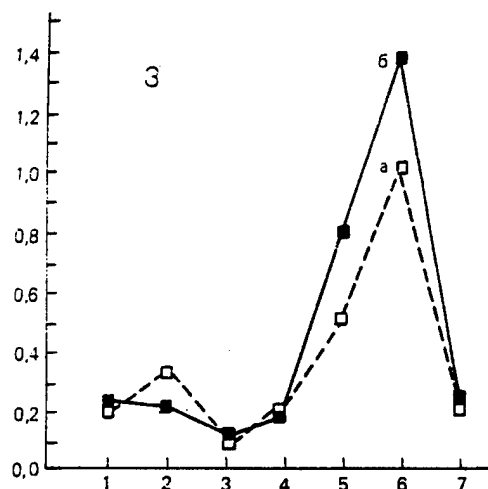


Figure 3. Colon Cancer Morbidity by Site: a—men under 50; b—women under 50. x-axis: 1—cecum + appendix; 2—ascending colon + hepatic flexure; 3—transverse colon; 4—descending colon + splenic flexure; 5—sigmoid colon; 6—rectum; 7—unspecified site; y-axis—morbidity indicators for 1985-1987, standardized in relation to the world population

figures for 1978-1980 were recorded in Rostov-on-Don (13.2 among men, 10.2 among women), Moscow (12.7 and 11.5), Minsk (11.9 and 9.5), and Kiev (11.9 and 10.8). It also indicates that morbidity levels were lower among urban residents of Belorussia (8.9 and 6.8) and in Vilnius (9.1 and 8.4) and that indicators were still lower in Voronezh (3.8 and 4.2).^{2,3}

When ranked in relation to world colon cancer morbidity indicators, Moscow may be said to be average. Similar morbidity is noted in the FRG (Hamburg), where it is 15.6 among men, 15.5 among women; in France (Calvados), where it is 14.7 and 10.6; in Los Angeles (among Latin Americans), where it is 14.7 and 12.1; in Sweden, where it is 16.6 and 14.7; and in Italy (Parma), where it is 18.8 and 13.1.⁸

According to our data, women under 50 suffer from both rectal and colon cancer more frequently than do men, probably because of the high frequency of affliction of the sigmoid colon. That feature is typical of populations in which morbidity levels are high.⁵ In the opinion of a number of authors,^{6,7} that may be explained by the high levels of estrogen hormones in women in premenopause that are capable of influencing formation of bile acids in the liver, increasing their secretion and consequently raising the risk of development of cancer of the large intestine. In older age groups, the risk of colon cancer decreases among women, at which point morbidity among men begins to dominate.

Cancer morbidity indicators pertaining to different sections of the colon diminish from the cecum and ascending colon to the transverse colon, and then

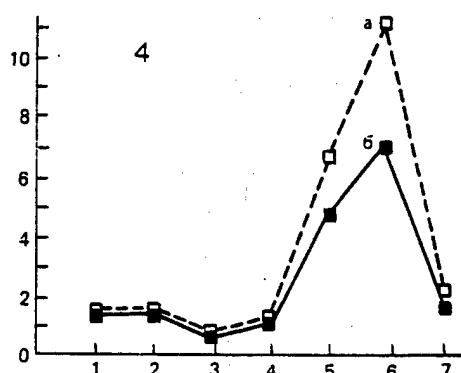


Figure 4. Colon Cancer Morbidity by Site: a—men over 50; b—women over 50. x-axis: 1—cecum + appendix; 2—ascending colon + hepatic flexure; 3—transverse colon; 4—descending colon + splenic flexure; 5—sigmoid colon; 6—rectum; 7—unspecified site; y-axis—morbidity indicators for 1985-1987, standardized in relation to the world population

increase in the sigmoid colon. The same pattern was also revealed in Moscow. According to the results of prior research, in women incidence of disease is 10-20 percent higher in the proximal section of the large intestine⁷; we were unable to reveal such a difference.

It was hypothesized, on the basis of epidemiological and laboratory observations,⁷ that in addition to other factors, environmental and dietary factors and, to a lesser degree, endogenous factors (sex hormones) have a greater influence on the risk of cancer in the distal section of the large intestine. However, we did find a substantial difference in the frequency of affliction of the distal section of the large intestine among men and women under and over 50. It may be that we cannot completely reject the supposition that sex factors play a role in the genesis of cancer of descending sections of the large intestine.

It should be noted that regions in which morbidity is high typically have similar levels of affliction of the right and left half of the colon. The morbidity figures we obtained for cancer of the sigmoid colon are much higher than for the cecum and ascending colon; consequently, we can theoretically expect an increase in the incidence of diseases of the cecum and ascending colon in Moscow. A trend of growth of morbidity for those sites exists in the United States, where colon cancer is encountered one and a half-two times more frequently.¹¹

In comparison with international data, rectal cancer morbidity is average in Moscow. Similar indicators were recorded in Switzerland (Geneva), where it is 12.8 in men and 9.8 in women; in Italy (Parma), where it is 13.3 and 8.2; in the GDR, where it is 13.9 and 9.9; and in Japan (Nagasaki), where it is 12.9 and 7.7.⁸ The greatest frequency of rectal cancer in the USSR in 1985 was

recorded in Estonia (13.9 in men, 8.5 in women) and Lithuania (12.6 and 8.1); whereas the lowest indicators were recorded in Transcaucasian and Central Asian republics: in the Tajik SSR (2.3 and 3.6), Uzbek SSR (3.6 and 3.1), Georgian SSR (4.6 and 3.3) and Azerbaijan SSR (4.7 and 3.5).¹ Thus, the morbidity indicators obtained in Moscow may be evaluated as being among the highest in the USSR.

The absence of a trend of either growth or reduction of rectal cancer morbidity among women in Moscow may be interpreted in two ways: on one hand, judging from international data, a statistically reliable decrease in rectal cancer morbidity was noted among both sexes in the preceding decade in regions of high morbidity—in the United States, for example—and our result, while it may be difficult to explain, is a natural reflection of the processes that are associated with morbidity in regions with a high frequency of rectal cancer. On the other hand, it may be possible that the reason that a trend was not detected was that the period of observation was not long enough.

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Population-Level Immunological Monitoring

907C0708E Moscow *IMMUNOLOGIYA in Russian*
No 2, Mar-Apr 90 pp 49-52

[Article by R. V. Petrov, I. V. Oradovskaya, and B. V. Pinegin, Institute of Immunology, USSR Ministry of Health, Moscow]

[Abstract] A brief outline is provided of an approach to immunological monitoring of the population in a given region, taking into consideration the high cost and complexity of immunological tests. Accordingly, the plans call for careful sample selection from various cohorts and careful analysis of environmental factors and the ecological situation. The objective is to create a database on the basis of which appropriate remedial actions could be taken once risk groups are identified. Figures 1.

UDC 616.89-008.441.33-082(477.63)

Experiment in Organizing Compulsory Treatment and Rehabilitation of Drug Abusers in Therapeutic-Vocational Prevention Center

907C0623B Moscow *VOPROSY NARKOLOGII in Russian* No 1, Jan-Mar 90 (manuscript received 12 Jun 89) pp 48-51

[Article by Yu. V. Petrakov and K. B. Boldyrev, Dnepropetrovsk Work-Therapy Prevention Center No 32]

[Abstract] The drawbacks of the compulsory treatment of drug addicts can be traced back to inadequate theoretical preparation of the medical staff, poor financial support, and weak organization of the treatment itself. The leading role in the treatment of drug addicts belongs to the hospitalization phase. Working with the Department of Psychiatry at the Dnepropetrovsk Medical Institute Faculty for the Advanced Training of Physicians, a 30-hour course was developed for the physicians at the Work-Therapy Prevention Center to correct the problems. All support staff members were given special instructions on the treatment of drug addicts. The principal tasks with each patient include attempts to normalize their behavior, suppress their dependence on the narcotic, create a critical introspective analysis, and awaken the will to creative work and the belief that they can be cured. Hospital therapy includes three phases: admission-diagnosis phase (25-30 percent of the available beds), psychological adaptation and active therapy (40-50 percent of beds) and work adaptation (25-30 percent of beds). The patients are under strict control; considerable isolation is practiced to avoid interaction among patients in different phases of the therapy. Drugs are administered in presence of the staff, usually in liquid or parenteral form, avoiding tablets or pills. Physicians control the therapy by the changes observed in the clinical state of their patients. The principal criterion for the release from hospitalization is the normalization of their psychologic state. The outpatient treatment after the release from hospital concentrates on strengthening of the remission and on vocational rehabilitation. With this program 16.6 percent effectiveness of treatment was achieved in 1988.

UDC 616.89-008.441.13-08-039.57

Experiment in Organizing Outpatient Narcologic Assistance to Alcoholics Resisting Voluntary Treatment

907C0623C Moscow VOPROSY NARKOLOGII
in Russian No 1, Jan-Mar 90 (manuscript received
12 Jun 89) pp 51-53

[Article by A. L. Nelidov and Yu. M. Sorokin, Narcologic Public Health Clinic of Gorkiy Oblast]

[Abstract] Of the 7,054 alcoholic patients admitted in 1985 to the drug abuse office of the Automobile Plant in Gorki, 3,969 refused professional therapy. During 1986-1987 two positions were added to the staff for drug abuse specialists; their job was to perform preclinical consultations at the public points for law enforcement (PPLE), examine those refusing treatment (including those released from work-therapy treatments), select the candidates for outpatient, hospital, and compulsory treatment, and educate the public, concentrating on the families of the alcoholics. Files were set up for those confirmed as refusing to undergo treatment. Special evening hours were established for their examinations. Special attention was paid to their families with whom systematic contact was maintained. The results of this program were very gratifying. In three years (1986-1988) the number of alcoholics refusing therapy dropped by two and a half-fold; the number of those entering outpatient treatment doubled, and those entering hospital treatment increased one and a half-fold. In 1989, out of 1,238 treatment refusers examined at the PPLE, 546 (44.1 percent) decided to participate in rehabilitation program. Tables 1; references 5: 4 Russian, 1 Western.

UDC577.391.621.311.25.004.65

Genetic and Biological Effects of Long-Term Exposure to Chernobyl Radioactive Fallout on Winter Rye*907C0848A Moscow RADIOBIOLOGIYA in Russian Vol 30 No 3, May-Jun 90 (manuscript received 5 Sep 89) pp 291-295*

[Article by Ye. Ya. Zyablitskaya, Ye. V. Spirin, N. I. Sanzharova and R. M. Aleksakhin, All-Union Scientific Research Institute of Agricultural Radiology, Obninsk]

[Abstract] An analysis was conducted on chromosomal aberrations in winter rye root meristem cells and seed germination of M_2 generation plants, the M_1 generation of which had been subjected to radioactive fallout from the Chernobyl accident throughout the vegetative phase. The accumulated data showed that genetic defects, significantly above control levels, were evident in 24 h seedlings when the contamination density (CD) reached 250 MBq/m²³ and the total absorbed dose reached or exceeded 0.31 Gy. Depression of mitosis became evident at CD = 350 MBq/cm² and a total dose of 0.4 Gy, while germination was depressed at CD = 800 MBq/cm² and a total dose of 1.2 Gy. These observations also suggested that monitoring crops for genetic and biological sequelae may be used in analysis of radioactive pollution. Figures 1; tables 3; references 9 (Russian).

UDC577.391.58.039.1

Monitoring of Plantago lanceolata Seeds for Long-Term Irradiation: Seed Viability*907C0848B Moscow RADIOBIOLOGIYA in Russian Vol 30 No 3, May-Jun 90 (manuscript received 7 Mar 89) pp 296-299*

[Article by N. P. Frolova, O. N. Popova and A. I. Taskayev, Institute of Biology, Komi Scientific Center, Ural Department, USSR Academy of Sciences, Syktyvkar]

[Abstract] Plantago lanceolata seeds were monitored for sequelae of three years of irradiation within a 30 km zone of Chernobyl, with the level of gamma irradiation ranging from 0.03 to 70 mR/h. Assessment of seed weight, seed germination, and chromosomal aberrations failed to establish an adverse relationship between seed quality and the radioactive background. Figures 3; references 3: 2 Russian, 1 Western.

UDC577.391.591.434

Mechanism of Action of Radioprotective Sulfur Compounds on Intestinal Epithelium*907C0848C Moscow RADIOBIOLOGIYA in Russian Vol 30 No 3, May-Jun 90 (manuscript received 7 Aug 89) pp 348-352*

[Article by V. G. Vladimirov and Ye. V. Grigoryeva, Scientific Research Institute of Military Medicine, Siberian Department, USSR Ministry of Defense, Leningrad]

[Abstract] An analysis was conducted on the mechanism of radioprotective action of cystamine and gammaphos on intestinal epithelium in outbred male mice, 18-22 g, subjected to 10-17 Gy gamma irradiation. Histoautographic (³H-thymidine) studies performed on the jejunum of control animals and animals treated with cystamine (150 mg/kg, i.p.) or gammaphos (100 mg/kg, i.p.) 15 min before irradiation demonstrated that the drugs did not affect D_0 (radiosensitivity indicator) of the epithelial stem cells. However, the drugs induced DNA synthesis and the number of mitotic cells in the crypts, promoting more rapid repopulation of the villi and recovery of intestinal mucosa. Accordingly, these observations indicate that cystamine and gammaphos act on DNA to preserve its structure and/or enhance its repair. Figures 3; tables 3; references 11: 6 Russian, 5 Western.

UDC577.391:591.81

Correlation Between Radioprotective Action of Co(III) Biocomplex and Cytofluorometry of Peripheral Blood Lymphocytes*907C0848D Moscow RADIOBIOLOGIYA in Russian Vol 30 No 3, May-Jun 90 (manuscript received 14 Aug 89) pp 373-378*

[Article by R. K. Siddikov, A. B. Akbarov, P. A. Khamimov and N. Kh. Shadiyeva, Central Asian Medical Pediatric Institute, Tashkent]

[Abstract] Acridine orange-treated lymphocytes derived from the peripheral blood of animal were analyzed for secondary fluorescence to determine the utility of this parameter vis-a-vis other indicators in monitoring the radioprotective efficacy of a Co(III) biocomplex [Akbarov, A. B., et al., Koordinats. Khim., 14(1): 3-25, 1989]. Trials with outbred albino male rats (100-120 g) demonstrated that pretreatment with the Co(III) biocomplex (15 mg/kg; s.c.; 24 h before 5 Gy gamma irradiation) yielded a 90 percent prophylactic effect, while 4 mg/kg q.i.d. for 27 days after irradiation had a therapeutic effect of 66 percent. The data showed that the intensity of lymphocyte fluorescence was directly correlated with the dose of irradiation (3-8 Gy) over a 17 days period. Furthermore, intensity was also found to correlate with the fall in hemoglobin concentration and leukocyte and erythrocyte counts. Attenuation of the hematologic parameters by chemotherapy was reflected in diminished intensity of lymphocyte fluorescence. Consequently, monitoring of secondary fluorescence of lymphocytes derived from the peripheral blood was shown to express the degree of radiation injuries and efficacy of radioprotective agents. The beneficial effects of Co(III) biocomplex are evidently due to stabilization of cell membranes, attenuation of free radical reactions, and prevention of DNA damage. Figures 1; tables 3; references 12: 11 Russian, 1 Western.

UDC577.391.576.858

Detection of Low-Level Gamma Irradiation by Prophage Induction

907C0848E Moscow RADIOBIOLOGIYA in Russian
Vol 30 No 3, May-Jun 90 (manuscript received 3 Jul 89)
pp 385-389

[Article by M. V. Torosyan, O. V. Shishkova and O. A. Ayzenberg, Institute of Biophysics, USSR Ministry of Health, Moscow]

[Abstract] Lysogenic bacterial cultures were tested for their suitability as indicators of low-level gamma irradiation, employing *Pseudomonas aeruginosa* PA01 (PM63) and *Escherichia coli* K-12:AB1157(λ)/pKM101. The results demonstrated a linear relationship between prophage induction and a gamma dose range of 0.2 to 10 Gy, with a threshold of sensitivity of 0.25-0.5 Gy. Accordingly, lysogenic bacterial cultures appear to constitute suitable indicators for low-level gamma irradiation. Figures 2; tables 2; references 5: 4 Russian, 1 Western.

UDC577.391.576.858

Effects of Riboxin on Gamma Irradiation-Induced Prophage Induction and Bacterial Viability

907C0848F Moscow RADIOBIOLOGIYA in Russian
Vol 30 No 3, May-Jun 90 (manuscript received 3 Jul 89)
pp 390-394

[Article by M. V. Torosyan, O. V. Shishkova and O. A. Ayzenberg, Institute of Biophysics, USSR Ministry of Health, Moscow]

[Abstract] The demonstration that lysogenic bacterial cultures represent a sensitive indicator system—in terms of prophage induction—for low-level gamma irradiation with a threshold of sensitivity of 0.25-0.5 Gy, led to an assessment of the effects of the radioprotector riboxin. The results showed that exposure of lag phase *Pseudomonas aeruginosa* PA01(PM63) and *Escherichia coli* K-12:AB1157(λ)/pKM101 to at least 10 μ g/ml of riboxin for 20 min at 30°C before irradiation markedly reduced the coefficient of prophage induction. Concomitantly, riboxin was shown not to affect viability. Additional studies with repair-defective mutants led to the conclusion that the radioprotective action of riboxin was related to repair processes. Figures 3; tables 1; references 8 (Russian).

UDC616.98:578.828.6]-078.337

Recognition by Antiviral Antibodies of Synthetic HIV Peptides Immobilized on Nitrocellulose Filters

907C0852A Moscow *IMMUNOLOGIYA in Russian*
No 3, May-Jun 90 (manuscript received 20 Mar 89)
pp 10-12

[Article by A. L. Liozner, A. Yu. Tsygankov, D. V. Meshcheryakova, A. I. Autenshlyus, O. A. Kaurov, A. N. Prusakov, V. G. Afonin, L. Yu. Sklyarov and A. Yu. Nikolayev, Institute of Immunology, USSR Ministry of Health, Moscow; All-Union Scientific Research Institute of Highly Purified Biopreparations, USSR Ministry of Biomedical Industry, Leningrad]

[Abstract] Trials were conducted on the detection of HIV surface peptides, immobilized on nitrocellulose filters, by antiviral antibodies to determine the feasibility of this approach in creating a rapid screening test, relying on protein A-colloidal gold conjugate for detection of the antigen-antibody complexes in the filters. Synthetic peptides SP-III-19 and SP-III-12, representing 19 and 12 amino acid sequences of viral glycoproteins 41 and 120, respectively, were used to infiltrate the nitrocellulose filters. Studies with sera positive for HIV antibodies in Dupont HTLV-III ELISA and HIV CHEK assays showed excellent correlation with the present system. Tests with the immobilized peptides required only three-five min for completion, yielding positive results in 80 percent of the cases with SP-III-19 and > 90 percent with SP-III-12. In addition, there were no false positive results. Figures 1; tables 1; references 14: 7 Russian, 7 Western.

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